E&MJ METAL AND MINERAL MARKETS

WEEKLY MARKET INFORMATION ISSUED BY THE PUBLISHERS OF ENGINEERING AND MINING JOURNAL

Vol. 26 | NEW YORK, DECEMBER 22, 1955 | No. 51

THIS WEEK IN THE MARKETS . . .

- **Chilean copper workers remain on strike in defiance of Government.**
- **Domestic copper average price declines but top price higher.**
- **Lead and zinc continue in strong demand—but prices are unchanged.**

COPPER—Domestic average 43.445c, ref'y.

Copper was sold in good quantity the past week. The weighted average domestic price declined owing to a scarcity of the high priced metal sold by custom smelters. The top custom smelter price was 50.3c a lb delivered. Foreign prices were higher—the top was over 51c. Chilean copper workers remain on strike. About 10,000-11,000 tons have been lost in the past eight days. The workers are in defiance of the Government which holds the strike to be illegal; there are reports some of the union leaders at Braden and Potrerillos have been arrested. President Ibanez said some time ago he would, by decree, place in effect the statute the absence of which the union claimed to be striking over—apparently this has had no effect. Some suggest the workers want a vacation during the holidays. There is no indication of force being used by the Government.

Some factors indicate they can sell copper at flat prices of over 48c well into the second quarter. Bearish sentiment has diminished constantly in the past two months. The decline in London, most hold, has no significance—the supply and demand for copper contracts is easing for the holidays. The diverting to industry of 14,000 tons in the first quarter by the Government has had no noticeable effect on the market.

The Treasury recommended that Congress extend for one year the provision under which involuntarily liquidated inventories would not be a tax liability. It appears only one, possibly two, firms will be helped by this.

LEAD—15½c N. Y. (f.a.s. Gulf 14¼c)

Lead sales this week were 8,796 tons, much less than the preceding week. This does not indicate any change in the market situation. Many sellers are still reluctant to sell on a flat price—much business is being done at the *E&MJ* average. Talk continues of a price rise here; London price hit £115 cash asked, Wednesday afternoon. The Government asked for offers of lead and zinc for delivery mid-February—and will not even get token amounts from some sellers.

ZINC—13c, East St. Louis (f.a.s. Gulf 12c)

Zinc is as strong as ever. Buyers want flat prices and sellers prefer to sell on the average. The Government will get very little zinc; it asked for offers, to be shipped by February 15. Some factors indicate they would not be surprised to see a higher price here in January.

QUICKSILVER—$280-$284 per flask, N. Y.

There was little change in the quicksilver market in the past week. Some factors believe the market weakened a little and others suggest a slight drop in the price is in the offing. Metal can be bought for the third week in January at $278. Sales of Mexican metal were made at prices a little lower than the above. Imports have been fairly heavy this month.

ALUMINUM—Pig 22.5c per lb; ingot 24.4c

The aluminum market continues to get even tighter. In the past week scrap prices have moved up about ½c. Some producers of secondary ingot have raised prices but others have not.

The primary aluminum production cut-back by Alcan, reported here in the Nov. 17 issue, will be greater than previously indicated. The fourth quarter 1955 drop will be less than 10,000 tons, but Isle Maligne and Shawinigan Falls also will curtail; Alcan estimates a loss of about 65,000 tons from January to April 20. Alcan is pushing its increase in production capacity—by the end of 1956 it may have an annual rate of about 50,000 tons more than now.

The continual tightening in aluminum reflects not only the Alcan curtailment but the world-wide pressure of demand for both old and new uses.

Daily average output of aluminum reached a new high in November, according to data released by the Aluminum Association. November production was 133,689 tons and October output was 134,655 tons.

SILVER—90½c N. Y. (London 78⅜d)

Though there has been a seasonal decline in buying, it has had no great influence. Fewer U.S.S.R. sales has had some effect on the supply.

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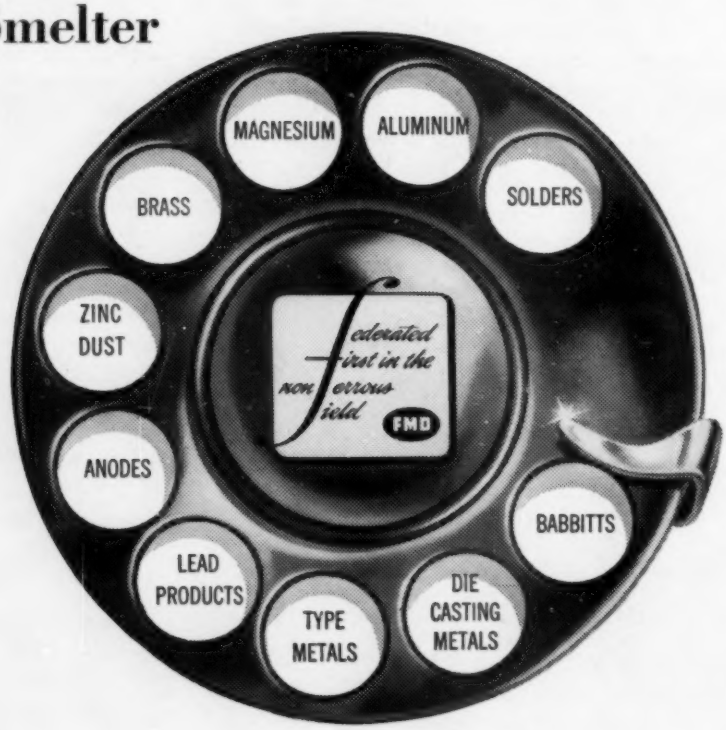
More Customers Buy More Non-Ferrous Metals From FEDERATED Than From Any Competing Smelter



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E&MJ METAL AND MINERAL MARKETS

WEEKLY MARKET INFORMATION ISSUED BY THE PUBLISHERS OF ENGINEERING AND MINING JOURNAL

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C. J. COASH.....*Publisher*

E&MJ Metal and Mineral Markets is published each Thursday with a daily quotation for copper, lead, zinc, tin, and silver. Commodities that change infrequently are quoted at weekly or monthly intervals.

E&MJ METAL & MINERAL MARKETS Dec. 22, 1955, Vol. 26, No. 51. Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Executive, Editorial, Advertising and Publication office, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Joseph H. Allen, Director of Advertising; Ralph B. Smith, Vice President and Editorial Director; J. E. Blackburn, Jr., Vice President and Circulation Director. Price per copy, 25 cents (United States currency). Subscriptions: Address correspondence to E&MJ Metal and Mineral Markets, Subscription service, 330 W. 42nd St., New York 36, N. Y. Allow 10 days for change of address. In the United States and Possessions $8 per year, $12 for 2 years, $16 for 3 years, Canada $10 per year, $16 for 2 years, $20 for 3 years. Other Western Hemisphere and the Philippine Islands $15 per year $25 for 2 years, $30 for 3 years. Elsewhere $25 per year, $40 for 2 years, $50 for 3 years. Please indicate position and company connection in all subscription orders.

Entered as second-class matter February 27, 1950, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

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New Records Made by the Aluminum Industry in 1955

Donald M. White
Secretary, The Aluminum Association

For the fourth year in succession, the U. S. aluminum industry has established new all-time records. Industry estimates indicate that primary aluminum production during 1955 will exceed three billion lb for the first time, and it is expected to be about 7% over the 1954 total.

Shipments of semifabricated aluminum products by members of the Aluminum Association show large increases in 1955 over the preceeding year. Statistics for the first three-quarters show shipments of sheet and plate up 39%; foil 41%; extruded products 50%; drawn tube 30%; rolled bar and rod 25%; wire (other than electric conductor) 32%; castings 28%; electric conductor 5%; and forgings 4%. Although the last-quarter shipments may show somewhat lower gains over their 1954 counterparts, the over-all figures for the entire year undoubtedly will top the 1954 totals by substantial margins.

Production of aluminum ingot from scrap also showed a substantial increase in 1955 over last year. Statistics compiled by the U. S. Bureau of Mines show a rise of 26% in the consumption of aluminum-base scrap during the first six months of the year. Figures for the second half are expected to show a comparable advance over 1954.

Despite record production, the metal was in tight supply during the year as a result of the continued rise in demand for aluminum products. The situation was partly relieved by the Government's action in diverting to industry substantial amounts of metal from stockpiling calls. The Office of Defense Mobilization has announced that there will be no calls for the stockpile in the first and sceond quarters of 1956. Including the amounts to be deferred during the first half of next year, the Government will then have made available for civilian use a total of 900,000,000 lb of aluminum since the first quarter of 1955.

Two price increases became necessary in 1955 to meet wage increases, further advances in the cost of raw materials and the rising cost of new plant construction. These brought the base price of primary aluminum pig to 22.5c. There were corresponding increases in the prices of most fabricated aluminum products. Despite these increases, however, aluminum maintained, and in some instances bettered, its over-all position with respect to the prices of competing materials.

One new primary producer began operations during 1955, bringing the number of producers in this country to four. Several other companies are planning to enter the primary aluminum industry. The new plants planned by these companies, together with the expansion planned by existing producers, would add more than a billion lb to the nation's annual primary aluminum capacity.

Plans for increased aluminum production are being matched by increased mining of bauxite ore in all areas and new ore-refining capacity. Two producers have announced plans for building new ore-refining (alumina) plants for processing South American and Jamaican bauxite.

Increasing demand for aluminum products has also stimulated a substantial expansion in fabricating-plant capacity. All of the present primary producers and many of the nonproducing fabricators have added new fabricating capacity during the year, are in the process of building more and have still more in the planning stage. The new fabricating equipment includes sheet rolling mills up to 100 in. in width and foil mills up to 72 in. wide. Included also are a number of units in the Government's heavy press program. Two companies are increasing their capacity for the production of covered aluminum wire for electric conductor purposes.

Several new alloys were announced

(*Continued on p. 10*)

Crude Copper Output Declined Here and Abroad in November

Copper Institute statistics for November were not surprising to people in the industry, though some felt the increase in U. S. deliveries to fabricators encouraging and the slight drop in crude output here and abroad somewhat discouraging.

Statistics for October and November in short tons, from the Copper Institute, follow:

United States

Production:	(a) Oct.	Nov.
Crude, primary	99,514	93,697
Crude, secondary	10,279	7,885
Totals	109,793	101,582
Refined copper	127,765	133,711
Deliveries, refined	133,834	141,807
Stock at end, ref'd	49,738	48,736

Outside United States

Production:		
Crude, primary	145,948	134,949
Crude, secondary	1,160	1,419
Totals	147,108	136,368
Refined copper	116,490	106,252
Deliveries, refined	113,064	106,951
Stock at end, ref'd	177,523	169,852

(a) Corrected figures.

Combined U. S. and foreign production of copper by the group of companies reporting to Copper Institute, 1954 and the eleven months of 1955, in tons:

	1954 Year	Jan.-Nov. 1955
Crude, primary	2,358,107	2,398,818
Crude, secondary	107,745	121,352
Totals	2,465,852	2,520,170
Refined copper	2,466,547	2,477,960

The statistics in the following table, computed from Copper Institute data, show the maximum copper production and deliveries for any one year, and the November 1955 figure at an annual rate. In most cases the latter figure would be larger if data from some other month were used.

United States

	Maximum	Nov. annual rate
Production:		
Crude, primary	1,111,022 (a)	1,124,352
Crude, secondary	135,052 (b)	94,620
Totals	1,246,074	1,218,972
Refined copper	1,395,003 (c)	1,640,532
Deliveries, refined	1,643,677 (a)	1,701,684

World

Production:		
Crude, primary	2,399,192 (c)	2,743,752
Crude, secondary	145,293 (b)	111,648
Totals	2,544,485	2,855,400
Refined copper	2,515,069 (c)	2,879,556
Deliveries, refined	2,455,875 (d)	2,985,096

(a) 1943 (b) 1949 (c) 1953 (d) 1954

In some cases it is certain the 1955 figure will be greater than the comparable figure for any previous year. The above figures for the world do not include the period of World War II; the statistics for that period are uncertain.

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Recognize Staff Association

KITWE (Reuters)—Northern Rhodesian copper mining companies have given recognition to the African Staff Association of Mines, it was announced.

The Association has been recognized in respect of African mine employees holding supervisory or staff positions, with the exception of police and forest guards.

International Minerals and Metals Corporation

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COPPER, ZINC

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SCRAP, RESIDUES
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Douglas, Arizona — El Paso, Texas
FOR NATIONAL ZINC COMPANY
(Subsidiary)
Bartlesville, Oklahoma

SELLERS

COPPER (ELECTROLYTIC)
CADMIUM
ZINC AND BY-PRODUCTS
MERCURY

Tungsten
Tin
Antimony

BUYERS

Tungsten Concentrates, Tungsten Tin Concentrates • Mixed Tungsten Ores • Tungsten Tailings, Scrap, Tips, Grindings • Tin Concentrates — Tin Dross, Tin Furnace Bottoms.

SELLERS

Tungsten Concentrates to Buyers' Specifications • Tungsten Salts, Tungsten Powder • Tungsten Rods, and Wires • Tin Ingots, Tin Oxides, Tin Chlorides.

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WAH CHANG
CORPORATION

Miscellaneous Metals

Quotations cover wholesale lots, f.o.b. New York, unless otherwise specified.

ALUMINUM — Per lb., base price, f.o.b. shipping point, (freight allowed): 30 lb. ingot, 99% plus, 24.4c.; in pigs, 22.5c.

Base prices on aluminum ingot of higher purity: 99.75%, 24.9c.; 99.8%, 25.4c.; 99.85%, 26.4c.

ANTIMONY — Cents per lb., 99½% grade:

	Domestic Boxed (a) New York	Domestic Bulk (b) Laredo
Dec. 15	36.470	33.000
Dec. 16	36.470	33.000
Dec. 17	36.470	33.000
Dec. 19	36.470	33.000
Dec. 20	36.470	33.000
Dec. 21	36.470	33.000

(a) Boxed (224 lb.) 10,000 lb. or more but less than carload. (b) In bulk, carload, f.o.b. Laredo; boxed one-half cent extra.

BISMUTH — Per lb., in ton lots, $2.25.

CADMIUM — Per lb., delivered.

	Commercial (a) Sticks	Special (b) Shapes
Dec. 15	$1.70	$1.70
Dec. 16	1.70	1.70
Dec. 17	1.70	1.70
Dec. 19	1.70	1.70
Dec. 20	1.70	1.70
Dec. 21	1.70	1.70

(a) Base price. (b) Special shapes to platers.

CALCIUM—Per lb., in ton lots, cast in slabs and small pieces, $2.05.

CHROMIUM — Per lb., 97% grade, 0.5% C, $1.25; 9-11% C, $1.34. (Usually sold as chrome-metal.)

Electrolytic chromium, commercial grade, 99% min., f.o.b. Niagara Falls, N. Y., per lb.: $1.25.

COBALT—Per lb., rondelles or granules, in 500 to 600 lb. containers, $2.60; in 100 lb. containers, $2.62; less than 100 lb. containers, $2.67. Prices ex. docks or store N. Y. or Niagara Falls.

Cobalt fines, $2.60 per lb. of Co contained, f.o.b. N. Y. or Niagara Falls, standard package of 650 lb.

COLUMBIUM — No quotation.

GALLIUM — Per gram, in 1,000 gram lots, $3; 1 to 999 grams, $3.25.

GERMANIUM — Per lb., $295.

INDIUM — Per oz. troy, 99.9%, $2.25.

IRIDIUM — Per oz. troy, $100@$110.

LITHIUM — Per lb. 98%, $11@$14.

MAGNESIUM — Per lb., 10,000 lb. lots: Pig ingot 99.8%, Freeport, Tex., 32.5c; Port Newark, N. J. 33.9c; Madison, Ill., 33.7c; Notched ingot, Freeport, 33.25c; Port Newark 34.7c; Madison, 34.5. Effective Aug. 16, 1955.

MANGANESE—Per lb., delivered, 95.5% Mn, 2 in. x down, carloads, bulk, 45c.; packed, 46¼c.

Electrolytic, per lb., f.o.b. Knoxville, Tenn., with freight allowed east of Mississippi; Min. 99.9% Mn.; Carload 30c.; ton lots, 32c. Premium for hydrogen-removed metal 0.75c, per pound.

MOLYBDENUM — Per lb., 99% $3.00.

NICKEL — Per lb., electrolytic cathodes, f.o.b. Port Colborne, Ont., contract price, 64½c, U.S. import duty included. Nickel oxide sinter, 60¾c per lb. of nickel content, f.o.b. Copper Cliff.

OSMIUM — Per oz., $80@$100, nominal.

PALLADIUM — Per oz troy, $23@$24.

PLATINUM—Per oz troy $97@$117. Our appraisal of average, $104.

QUICKSILVER — Per flask of 76 lb, $280@$284.

RADIUM — Per mg. radium content, $16@$21.50, as to quantity.

RHODIUM — Per oz. troy, $118@$125.

RUTHENIUM — Per oz. troy, $45@$55.

SELENIUM—Producers quote $9@$10 per lb; distributors $10.50.

SILICON — Per lb., minimum, 97 percent Si, maximum 1 percent Fe, crushed, carload lots, in bulk, 20½c.

SODIUM — Per lb., carload lots, in drums, 16½c.; less than carload lots, 17c.

TANTALUM — Per kilo, base price, $137 for rod; sheet, $93.

TELLURIUM — Per lb., $1.75.

THALLIUM — Per lb., $12.50.

TITANIUM — Per lb., Grade A-1, 99.3% plus, maximum 0.3% iron, $3.45 f.o.b. shipping center. (On maximum .5% iron, $3.15.) Effective Nov. 23.

TUNGSTEN — Per lb., 98.8% minimum 1,000 lb lots, $4.30, effective Dec. 1. Hydrogen reduced, 99.9% plus, $5.

VANADIUM — Per lb, 100-lb lots, $3.45.

ZIRCONIUM — Per lb., sponge, $10.

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Metallic Ores

Prices in tons of 2,000 lbs., or "units" of 20 lb., unless otherwise stated.

ANTIMONY ORE—Per unit of antimony contained, 50 to 55%, $3.20@$3.35; min. 60% $3.90@$4.00; min. 65% $4.05@$4.25.

BERYLLIUM ORE — Per unit BeO contained, 10-12% f.o.b. mine, Colorado, $46@$48, depending on quantity.

Imported ore, per short ton unit of BeO, c.i.f. U.S. ports, basis 10% to 12% BeO, $36@$38.

CHROME ORE—Per long ton, dry basis, subject to penalties if guarantees are not met, f.o.b. cars N. Y., Phila., Balt., etc.

Rhodesian:
48% Cr_2O_3, 3 to 1 ratio lump (b) $45.00@$46.00
48% Cr_2O_3, 2.8 to 1 ratio.. (b) $42.00@$43.00
48% Cr_2O_3, no ratio..... (b) $33.00@$35.00

South African (Transvaal):
48% Cr_2O_3, no ratio.....$31.00@$32.00
44% Cr_2O_3, no ratio.....$23.50@$24.50

Turkish (basis 48% 3 to 1):
48% Cr_2O_3, 3 to 1 ratio, lump and concentrates .....$52@$53
46% Cr_2O_3, 3 to 1 ratio, lump and concentrates .....$46@$48
Pakistan (Baluchistan):
48% Cr_2O_3, 3 to 1 ratio .....(a)$49@$50
(a) Nominal. (b) Long term contracts.

COBALT ORE — Per lb of cobalt contained, f.o.b. Cobalt, Ont., 9% grade, $1.30; 10%, $1.40; 11%, $1.50; 12%, $1.60.

COLUMBITE — Per lb of pentoxide, $1.35@$1.65, basis 50% Cb_2O_5. Nominal.

IRON ORE — Per long ton, Lower Lake ports. Lake Superior ore:

Mesabi non-bessemer, 51½% iron, $10.10. Old Range, non-bessemer, $10.25.

Mesabi, bessemer, 51½% iron, $10.25. Old Range, bessemer, $10.40.

Eastern ores, cents per long ton unit, delivered at furnaces: Foundry and basic, 56@62%, 17@18c.

Swedish, 60@68% (contracts), per unit, 22c plus, depending on grade, c.i.f. Atlantic ports.

Brazilian, per gross ton, 68.5% iron, f.o.b. port of shipment: Contracts $11.50 @$12.00; nearby business $12.25@$12.50.

MANGANESE ORE—Consumption continues at high level, and business has picked up slightly. Freight rate increases and strengthening demand have pushed up the price to consumers.

Indian ore was quotable at $1.12@$1.17 per long ton unit of Mn, c.i.f. U. S. ports, duty extra, basis 46 to 48% Mn, nearby positions.

On long-term contracts for ore from various sources, 46@48% Mn, quotations nominal at 94@96c, c.i.f. U.S. ports, duty extra.

Low iron, 48% Mn (max. 2% Fe), $1.12 per long ton unit of Mn, duty extra.

Chemical grade, per ton, coarse or fine, minimum 84% MnO_2, carloads, in drums $96; burlap bags $90.50 f.o.b. Philadelphia.

MOLYBDENUM ORE — Per lb of contained Mo, f.o.b. Climax, Colo., plus cost of containers, $1.05.

TITANIUM ORE—Per gross ton, ilmenite, 59.5% TiO_2, f.o.b. Atlantic seaboard, $20, nominal.

Rutile, per lb, minimum 94% concentrate, 10@15c, depending on time of delivery.

TUNGSTEN ORE — Per short ton unit of WO_3, concentrates of known good analysis, basis 65%:

Foreign ore, per short ton unit of WO_3, nearby arrival, c.i.f. U.S. ports, duty extra: Wolfram. $33.00@$33.50; scheelite $34.00@$34.50, depending on grade.

Western high grade scheelite concentrate, $63 per unit, f.o.b. mine.

North Carolina high grade concentrate, $63 per unit, f.o.b. mine.

London, per long ton unit of WO_3, buying prices, good ore: Wolfram 267s bid, 271s asked.

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MANGANESE ORES • Metallurgical • Chemical
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VANADIUM ORE — Per lb V_2O_5 contained, domestic, 31c, f.o.b. mine.

ZIRCON ORE (sand) — Per long ton, c.i.f. Atlantic seaboard, minimum 65% ZrO_2, $48@$49.

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Metallic Compounds

ANTIMONY TRIOXIDE — Per lb, carload lots, in bags, 29c; less than carload, 30½c.

ARSENIOUS OXIDE (arsenic trioxide), refined, white min. 99%, per lb, 5½c, in barrels carload lots delivered.

COBALT OXIDE — Ceramic grade 72½ to 73½% Co, $1.96 per lb east of Mississippi and $1.98½ per lb west of Mississippi. Quotations are for oxide packed in 350-lb containers.

COPPER SULPHATE — Per lb, in carload lots, 14.9c, large or small crystals, f.o.b. N.Y.

GERMANIUM OXIDE — Per lb, $142.

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Rolled Metals, Etc.

BRASS — Cents per lb (base prices)

	Sheet	Wire	Rods
Yellow Brass	52.27	52.81	(a)42.41
Best quality brass ..	54.29	54.83	54.23
Red brass 80%	56.55	57.09	56.49
Red brass 85%	58.09	58.63	58.03
Com'l bronze 9%	60.18	60.72	60.12
Gilding metal	61.74	62.28	61.68

(a) Free cutting

CADMIUM — Per lb Special shapes, to platers, $1.70.

COPPER — Per lb Sheets, over 20 in. wide, 62.76c, rolls 20 in. and under, 60.79c; Wire, bare, carload lots f.o.b. mills 48.35c.

LEAD SHEETS — Per lb, full rolled, 140 sq ft, 21c.

MONEL METAL — Per lb (base prices) Standard cold-rolled sheet, 78c; cold-rolled strip, 87c. Rods, hot-rolled 69c.

NICKEL — Per lb (base prices) sheets, cold-rolled, $1.02; rods, hot-rolled, 87c.

NICKEL SILVER — Per lb, sheets, 10% 66c; 18% 69.63c; wire and rods, 10% 68.33c.

PHOSPHOR BRONZE — Per lb, sheets, 5% tin, 80.99c; wire and rods, 5% 81.49c; 10% 87.53c.

ZINC — Per lb, carload lots f.o.b. mill (base price): Sheet 23c; ribbon 20½c; plates 19½@22¼c, depending on size.

ZINC DIE-CASTING ALLOY — Ingot per lb, carload lots, delivered, 17½@18½c.

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United States Gold Price

The price paid by the United States Treasury for gold purchased by the mints continued at $35 per troy ounce of fine gold, less ¼ of 1%.

Actual payment by the United States Treasury for gold in imported and domestic ore or concentrate is at 99.75% of the price quoted by the Treasury, which at present is equal to $34.9125 per oz.

FRED H. LENWAY
AND COMPANY, INC.
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TELEPHONE: DOUGLAS 2-8560
Buyers of...
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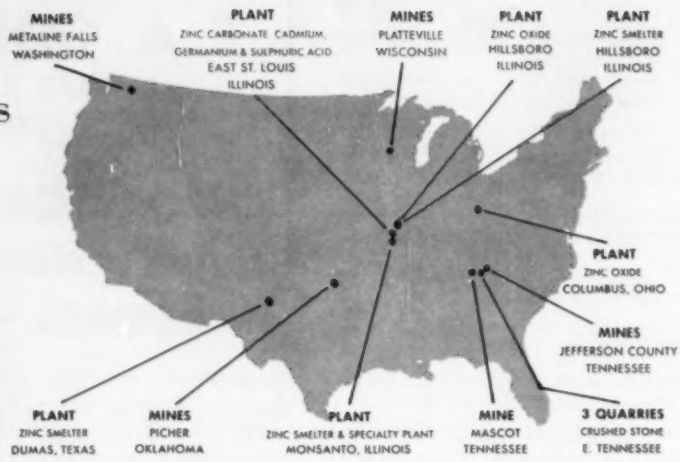

FORT SMITH, ARKANSAS, PLANT OPERATES UNDER CONTRACT WITH AMERICAN ZINC

Zinc smelter, owned and operated by the Athletic Mining and Smelting Company, produces Prime Western slab zinc for American Zinc exclusively. Plant has roasting and nodulizing equipment, as well as horizontal retort furnaces. For complete picture of American Zinc's own operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
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WATCH THESE TRENDS

(A regular feature usually appearing the third week of each month)

RARE EARTH OXIDES, pure and separate are available from Research Laboratories of Colorado, Inc.; Lindsay Chemical Co., West Chicago, Ill.; Rare Earths, Inc., Pompton Plains, New Jersey; Research Chemicals, Burbank, Calif. and Michigan Chemical Co. Research Laboratories has recently announced price schedule ranging from $1.50 to $275 per single gram orders of any of the 15 individual rare earths.

Lindsay and Rare Earths have for some time been offering the individual rare earth oxides with prices ranging from $10 per pound for lanthanum and cerium to $100 a gram for the heavier elements in the group.

Process used by RLC is an adaptation by Drs. Frank Spedding and Jack Powell of a process developed at University of Iowa, Ames, Iowa. Raw material is Norwegian gadolinite, which is leached with nitric acid and the rare earths precipitated as the oxalate. Oxalate is converted to the oxide, then the chloride and finally loaded on Dowex 50 resin. Resin is eluted with ammonium ethylenediaminetetra-acetate to yield various cuts representing the individual rare earths. Cuts are precipitated as oxalate and ignited to the pure oxide.

Process at Lindsay involves essentially the same ion-exchange method, except that the raw materials are several types of concentrates readily available as by-products from multi-tonnage industrial processing of monazite concentrates. Not all of Lindsay's pure oxides are made by ion-exchange, some are still made by cheaper chemical methods. Rare Earths, Research Chemicals and Michigan Chemical all use the conventional chemical method to obtain pure compounds.

Lindsay's installation for pure rare earths, separated by conventional chemical means, has been in operation for several years. Its ion-exchange plant was installed this year and has been expanded more than twofold to meet increasing demand for separate oxides.

Present research at RLC is directed toward the commercial production of the individual rare earth metals and metal hydrides. Lindsay and Rare Earths have directed research toward improving the process and cutting costs of both ion-exchange and conventional crystallization (in the case of Lindsay) and of the crystallization method (in the case of Rare Earths). Lindsay has no immediate plans to produce metal.

Using the ion-exchange method, both Lindsay and Research Laboratories have been able to produce commercial quantities of samarium, europium, gadolinium, terbium, ytterbium, yttrium, lutetium and holmium in purities up to 99.9%.

Coupling this advance in technology with the $250,000 being spent by the Bureau of Mines to find new uses for the rare earths (nine of which have no use at all), the industry is taking the 'rare' away from the so called rare earths. Researchers in alloys, glasses, fungicides and pharmaceuticals can now get all they want at prices that continue to fall.

DUCTILE CAST IRON can outlast cast iron and steel with up to 18 times the service life, in dies and working parts of large presses. State Foundry and Machine Co., Cedar Grove, Wis. now has 43 separate patterns on presses used to make 20 mm cartridge cases. Dies on the presses are made of ductile cast iron and produced the 18 to 1 life service mentioned above. Shafts, the brake drums, links and gears of ductile iron are still in operation on some presses after outlasting previous material by five times.

Finished die material has Rockwell C hardness of 55. Ductile iron is produced by the International Nickel process, in which small amounts of magnesium are added to the melt.

Magnesium changes flake graphite to spheroidal shaped graphite and reduces the brittleness of the iron. Ductile cast iron is 4 to 12 times tougher than gray iron and shows good machinability and resistance to wear.

Four regular types and two special, one heat resistant and the other a high-alloy type, are available for consumers or licensees. Pressure vessels, plow shares, generator shafts, valves, gears, pumps, jet engine parts, dies and automobile cylinder blocks are some of the applications of ductile cast iron, according to International Nickel Co., Inc., 67 Wall St., New York 5, New York.

GADOLINITE from domestic sources and gangue-free might bring a lucky miner as much as $5 a pound. At $5 a pound for a clean concentrate, gadolinite would be a better deal than uranium. Gadolinite is a rare, black to brown silicate of iron and rare earths having specific gravity of 4 to 4.5 and hardness of 6.5-7. Present source for rare earth producers is Norway. If you have such a mineral or deposit write to Research Laboratories of Colorado, Inc., Post Office Box 307, Newton, Ohio.

ALUMINUM ALLOYS can be continuous cast using a new furnace designed by Monarch Aluminum Co. and Selas Corp. of America. Furnace, in operation at Monarch's Cleveland, Ohio plant, shows time and cost savings over conventional batch furnace and should be of interest to aluminum molders. Carbureted gas supplies fuel and oxidation is stopped by excluding outside air. The charge is up to pouring temperature in 3 hours as against 22 hours in batch furnace. Consumption of gas is claimed to be only 63% of batch furnace. No furnace relief periods needed for workers, since the temperature near the scene does not get out of hand with the new furnace.

SINTERED TUNGSTEN-CARBIDE in thin layers to steel surfaces is in appraisal stage at Carboloy Division, General Electric Co., Detroit 32, Mich. Technique is said to be new in that it provides a truly sintered bond to the steel. Coatings up to 0.030 in. have been applied to pickup pins and capstan rings as well as cylinder liners.

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Ferroalloys

FERROCHROMIUM — Per lb of Cr: High carbon (4-9% C) 65-69% Cr, lump, carloads f.o.b. destination continental U.S.A. 26¼c; low carbon, 0.01C, 32¾c.

FERROCOLUMBIUM — Per lb of Cb contained, 50-55%, $6.80@$6.90.

FERROMANGANESE—Per net (short) ton, 74-76% Mn, $205, f.o.b. shipping point seaboard and major domestic producing points.

FERROMOLYBDENUM, Etc. — Per lb of Mo contained, f.o.b. shipping point: Ferromolybdenum, 58-64% Mo, powdered, $1.66, all other sizes $1.54; calcium molybdate ($CaO\ MoO_3$), $1.34; technical molybdic trioxide (MoO_3), bagged, $1.30, canned, $1.31.

Quantity extras, subject to change without notice, follow:

5,000 lb or more, base price; 1,000 lb up to 4,999 lb, 2c; 600 lb up to 999 lb, 3c; 200 lb up to 599 lb, 6c; 25 lb up to 199 lb, 7c or 6c plus $5 packing charge depending on manufacturer.

FERROPHOSPHORUS — Per gross ton, 23-25% P, carloads f.o.b. Siglo, Mt. Pleasant, Tenn., $90. Unitage of $4 for each 1% of P above or below the 24% base.

FERROSILICON — Per lb of contained Si, f.o.b. shipping point: 50% grade 12¾c; low-aluminum 13.95c.

FERROTITANIUM LOW - CARBON — Per lb of Ti contained: 25%, 0.10% C, $1.50; 40%, 0.10% C, $1.35, f.o.b. destination east of Mississippi River.

FERROTUNGSTEN — Per lb of W contained, 72-82% W, $3.30 in lots of 5,000 lb or more.

FERROVANADIUM — Per lb of V contained: Open hearth, $3.10; crucible, $3.20; low-carbon and silicon, $3.30.

SILICOMANGANESE — Per lb carload lots, f.o.b. shipping point, bulk: 65-68% Mn, max. 1½% C, 18-20% Si 11.5c; max. 2% C, 15-17½ Si, 11.3c; max. 3% C, 12-14½% Si, 11.1c.

SPIEGELEISEN—Per gross ton, carload lots, f.o.b. Palmerton, Pa.: 16-19% Mn, 3% max. Si, $89.50; 19-21% Mn, $91.50; 21-23% Mn, $94.00.

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Brass and Bronze Ingot

85-5-5-5 (No. 115) 42c; 80-10-10 (No. 305) 45¾c; 88-10-2 (No. 215) 54¾c. Yellow, (No. 405) 33¼c; and upward. Manganese bronze (No. 421) 37¾c.

E&MJ QUOTATIONS

Daily Prices of Metals

Dec.	ELECTROLYTIC COPPER Domestic Refinery	ELECTROLYTIC COPPER Export Refinery	TIN Straits New York	TIN 99% (a) New York	LEAD New York	LEAD St. Louis	ZINC Delivered (b)	ZINC East St. Louis
15	43.650	45.150	110.000	109.000	15.500	15.300	13.500	13.000
16	43.450	45.500	110.000	109.000	15.500	15.300	13.500	13.000
17	No Market	45.500	110.000	109.000	15.500	15.300	13.500	13.000
19	43.400	45.400	109.500	108.500	15.500	15.300	13.500	13.000
20	43.350	44.850	109.375	108.375	15.500	15.300	13.500	13.000
21	43.375	44.275	109.375	108.375	15.500	15.300	13.500	13.000
Averages	43.445	45.113	109.708	108.708	15.500	15.300	13.500	13.000

(a) Nominal Quotation for tin content.

(b) Prime Western Zinc sold on delivered basis at centers where freight from East St. Louis exceeds one-half cent a pound.

Average Prices for calendar week ended Dec. 17 are: Domestic copper f.o.b. refinery, 44.165c; export copper f.o.b. refinery, 44.750c; Straits tin, 109.917c; New York lead, 15.500c; St. Louis lead, 15.300c; Prime Western zinc delivered 13.500c; East St. Louis zinc, 13.000c; and silver 90.514c.

The above quotations are our appraisal of the major United States markets, based on sales reported by producers and their agencies. They represent payments received by producers for the product. They are reduced to the basis of cash, New York or St. Louis, as noted. Prices in cents per pound.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

In the trade, domestic copper prices are quoted on a delivered basis, that is, delivered at consumer's plants. As delivery charges vary with the destination, the figures shown above are net prices at refineries on the Atlantic seaboard. Delivered prices in New England average 0.300c. per pound above refinery basis.

Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075, for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Quotations for copper are for ordinary forms of wirebars and ingot bars. The premiums on special shapes, effective in some instances on deliveries beginning Sept. 1, 1955, are: Standard ingots 0.25c per pound; slabs 0.55c and up, cakes 0.6c and up, depending on weight and dimensions; billets 1.725c and up, depending on dimensions and quality. Discount on cathodes 0.125c to 0.15c per pound.

Quotations for zinc reflects sales of the Prime Western grade as well as sales of other grades when sold on a Prime Western basis. Premiums obtaining over Prime Western zinc in the East St. Louis market on the following grades, in cents per pound: Selected 0.10c; Brass Special 0.25c; Intermediate 0.5c. High Grade zinc sold on contract, delivered to the consumers' plant, commands a premium of 1.35c per pound over the East St. Louis basis for Prime Western; on Special High Grade the premium or differential is 1.75c per pound, effective Dec. 1, 1955.

Quotations for lead are for the common grade, and are based on sales of domestically refined metal sold to domestic consumers. The differential on sales in the Chicago district is 15 points under New York; for California 20 points under New York; for New England add 7½ points to the New York basis. Corroding grade commands a premium over common lead of 10 points.

Note: The daily quotations for copper, lead and zinc are weighted averages of sales reported to E&MJ; weekly averages are arithmetical averages of the daily quotations; monthly averages are the arithmetical averages of the daily quotations.

Silver, Gold, and Sterling Exchange

Dec.	Sterling Exchange	Silver New York	Silver London	London Gold (a)
15	280.3928	90.750	78.750d.	249s. 4¾d.
16	280.2991	90.750	78.750d.	249s. 5½d.
17	Not Quoted			
19	280.1875	90.500	78.625d.	249s. 6½d.
20	280.2812	90.500	78.125d.	249s. 7d.
21	280.2812	90.500	78.375d.	249s. 5¾d.
Av.	280.288	90.600	(a) Open market	

The daily silver quotation reported by Handy & Harman, in cents and fractions of a cent per troy ounce, is the price paid by Handy & Harman in settlement for silver contained in unrefined silverbearing materials submitted to them for refining. It is determined on the basis of offers of bar silver .999 fine as made to Handy & Harman for nearby delivery at New York by regular suppliers in quantities sufficient to meet daily requirements, and it is usually one quarter cent below the price at which such offers are made.

The Treasury's purchase price of newly mined domestic silver was established at 90.5c per troy ounce, 1000 fine, effective on July 1, 1946 under an amendment to the Silver Purchase Act of July 6, 1939.

London silver quotations are in pence per troy ounce, basis .999 fine.

London gold quotations are per troy ounce, basis 1000 fine.

Sterling, in cents, N. Y. Federal Reserve Bank average of noon buying rates.

THIS WEEK'S BUSINESS INDICATORS

	Latest Week	Preceding Week	Month Ago	Year Ago	Net Change Year Ago
Steel Rate (% of capacity in operation)	97.5	(a) 100.3	100.1	72.4	+25.1
Steel Ingot Production, thousands of tons	2,353	(a) 2,421	2,416	1,726	+627
Automobile Production (cars and trucks)	204,191	(a) 213,561	213,468	179,850	+24,341
Electric Power Output (millions kwh.)	11,426	11,359	10,878	9,846	+1,580
Engr'g Const. Awards, 4-week daily av., in thousands (c)	$61,578	$54,932	$59,527	$50,319	+$11,259
Federal Reserve Index of Industrial Production (e)	(d) 144 Nov.	.....	143	126	+18
E&MJ Index of Nonferrous Metal Prices (b)	234.51 Nov.	.....	234.64	187.50	+47.01
All Commodities, Bureau of Labor Statistics (e)	(d) 111.5 Nov.	.....	111.5	109.7	+1.8

(a) Revised. (b) 100 is composite of 1922-3-4. (c) From Eng. News-Record. (d) Preliminary. (e) Base period 1947-49

London Metal Exchange

Dec.	COPPER Cash Bid	COPPER Cash Asked	COPPER 3 Mo. Bid	COPPER 3 Mo. Asked	LEAD Current Month Bid	LEAD Current Month Asked	LEAD 3 Mo. Bid	LEAD 3 Mo. Asked	ZINC Current Month Bid	ZINC Current Month Asked	ZINC 3 Mo. Bid	ZINC 3 Mo. Asked	TIN Cash Bid	TIN Cash Asked	TIN 3 Mo. Bid	TIN 3 Mo. Asked
15	404	405	396	396½	112¾	113	112¼	112½	97¾	98	95¼	95½	832½	835	815	816
16	395	396	388	389	112¾	113	112¼	112½	97½	98½	95¼	95½	834	837½	819	820
19	402	403	396	396½	112¾	113	112½	112¾	98	98¼	95½	95¾	834	835	815	816
20	400	401	394	394½	113¾	114	113½	113¾	98¼	98½	95¾	96	831	832½	811	812
21	397	398	390½	391½	114	114½	113¾	114	98½	99	96¼	96½	828	830	807	808

Prices are for the official a.m. session in pounds sterling per ton of 2240 lb. Copper basis wire bars, lead 99.97%, zinc 98% and tin min. 99.75%.

Note: For lead average, Monterrey, see page 10; U.S. Gold, see page 5.

Records in Aluminum

(Continued from p. 3)

during the year. These included alloy 5083, designed for welded structures requiring maximum joint strength and efficiency and resistance to corrosion; and alloy X2219 for extrusions and forgings with superior properties at elevated temperatures.

One of the nearest approaches to complete automation in the foundry field was achieved during the year in an aluminum permanent-mold foundry. This involved teaming a continuous melting furnace of new design with a rotating "turntable" on which the molds are mounted. The method is adaptable to a variety of different types of aluminum castings.

Building Materials Led

Among the many applications of the lightweight metal, building materials led the entire field of civilian uses during 1955 as they have every year since 1946. Statistics compiled by the Aluminum Association show that building materials accounted for about 19% of all wrought aluminum mill products shipped during the first half of the year. Transportation applications accounted for about 17% of these products; consumer durable goods (such as household appliances, furniture, lighting fixtures and the like) 13%; electrical uses 8%; commercial and industrial machinery and equipment (except electrical) 7%; and packaging and containers 5%.

Two notable conferences were held by user groups during the year. The first of these was a three-day conference on the electrical utilization of aluminum held by the American Institute of Electrical Engineers and devoted solely to uses of the lightweight metal in this field. The second was a conference held by the Building Research Institute on curtain walls. Since aluminum is playing a major role in this popular and economical type of construction, a good bit of discussion centered around this material.

Some of the most noteworthy new developments in the application of aluminum also were in the building and electrical fields. In the former, there is an increasing use of colored porcelain enameled aluminum sheet on building exteriors. Both sheet and extruded products also are being produced in a wider variety of anodically applied colored finishes.

In the electrical field, a particularly significant event was the inauguration by the country's largest manufacturer of communication cable of a development program looking toward the use of aluminum wire in such cable. Another significant development was the successful production of oxide-insulated spiral-wound coils of aluminum sheet for transformers and other electrical devices. Aluminum oxide is an excellent insulator, and increasing the thickness of the natural oxide coating by an anodizing treatment has made it possible to wind the coils without applying additional insulation.

New gains are being made by aluminum in automobiles, particularly in trim items where both plain and colored finishes are being used. More structural and engine parts of aluminum are in the offing, and one luxury-line car has come out with forged aluminum wheels and a gold-finished aluminum radiator grille.

The "atoms for peace" program has drawn increasing attention to the usefulness of aluminum in nuclear reactors and associated equipment. Aluminum is one of the few materials suitable for certain applications in these devices.

These are but a few of the numerous significant 1955 developments in the production and application of aluminum. As the industry continues to expand, more new production records may be expected in the years ahead as well as more new developments in application of the metal which will further enhance its usefulness.

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Rutile in Australia

SYDNEY (Reuters)—Associated Minerals Consolidated Ltd., has firm contracts exceeding A£1,000,000 for the sale of about two-thirds of its estimated production of rutile over the next five years, according to the chairman, W. E. Hopkins. He said that an increase in output seemed probably in the near future, for a reasonable capital outlay. Large reserves of minerals were held in the Cudgen (NSW) area. No plans would be formulated for the development of the South Stradbroke (Qld) area until the mineral content had been thoroughly tested, he said.

Meanwhile, Mineral Ventures N L has secured an option over rutile sand area at Evans Head (NSW) and has begun tests.

•

Delay in Tin Agreement

LONDON (Reuters) — Delay in the ratification of the International Tin Agreement is a matter for congratulation, G. W. Simms, chairman of the Sungei Besi Mines Limited and the Ayer Hitam Tin Dredging Company Ltd., declared in his annual statement to shareholders.

Mr. Simms said he believed it would be in the best interests of the Malayan industry if the scheme did not operate. The advocates of tin control invariably thought and spoke in terms of tin prices. They did not mention the adverse effect of production restrictions on operating costs. This was equivalent to a reduction in tin prices, Mr. Simms asserted. The prospects for tin were good and if the industry was allowed to function free from control, it would develop naturally, he added.

Tri-State Concentrates

Joplin, Dec. 20, 1955

Blende	*Per Ton*
Prime coarse (60% zinc)	80.00
Flotation, 60% zinc	80.00
Galena	
Coarse and flotation, 80% lead	(a)$195.05

(a) Effective Sept. 27, 1955.

•

Lead Average (Monterrey)

The net price realized by the American Smelting & Refining Co. on all of its sales of Mexican pig lead, including metal sold for consumption in Mexico, during the week ended Dec. 10, 1955, was 13.33 (U.S.) per lb, f.o.b. refinery Monterrey, Mex.

•

Smelters' Aluminum Alloys

Delivered prices of smelters' aluminum ingot per pound, in lots of 10,000 lb. or more.

Piston alloy D132, 32½@33¼c; No. 12 alloy 31½@32c, No. 13 alloy, max. .30 copper, 33¼@34c.

Deoxidizing grades: No. 1, 32¼@33c; No. 2, 31½@32c; No. 3, 30½@31c; No. 4, 29½@30c.

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Smelters' Copper Scrap Prices

Custom smelters' buying prices for scrap, carload lots, refinery:

No. 1 copper and wire, 43½c; No. 2 heavy copper, 42c; light copper 39½c; refinery brass, 39c.

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Dealers' Scrap Prices

Dealers' buying prices, f.o.b. New York or equivalent freight points, for wholesale quantities, in cents per lb.

No. 1 copper wire	42@42½
Heavy copper & wire, mixed	38½@39
Light copper	36@36½
No. 1 composition	32½@33
Composition turnings	31½@32
Light brass	19@19½
Yellow brass turnings, mix	20½@21
Heavy yellow brass, mixed	22@22½
Auto radiators, unsweated	25@25½
Brass pipe, cut	26@26½
Rod brass turnings, No. 1	26@26½
Rod ends, brass	26½@27
New soft brass clips	28@28½
Cast aluminum, mixed	17@17½
Aluminum crankcases	17@17½
Aluminum clips, new soft	20@20½
Sheet aluminum, old clean	17@17½
Aluminum turnings, clean	11½@12
Zinc die cast, mixed	3¼@3½
Zinc die cast, new	5½@5¾
Old zinc	5@5½
New zinc clips	8@8½
Soft or hard lead	12@12½
Battery plates	6½@6¾
Babbitt mixed	14½
Linotype or stereotype	13¼@13½
Electrotype	12½@12¾
Solder joints close cut	19@19½
Block tin pipe	84@87
Autobearing babbitt	48@50
Monel clips, new	60@65
Monel sheet, clean	60@65
Nickel, rod ends	100@125
Nickel, clippings	100@125

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U. S. Bureau of Mines Develops Method to Make Hafnium Metal

Hafnium metal, important to the atomic energy field, can be produced in the same equipment used for making its sister substance, malleable zirconium, the metal which has proved so valuable in constructing nuclear reactors, the Bureau of Mines reports.

Techniques for producing hafnium were developed by the Bureau at its Northwest Electrodevelopment Laboratory, Albany, Ore., as part of an Interior Department program to recover rare metals from domestic and foreign ores in cooperation with the AEC and the Navy's Bureau of Ships. Details of the hafnium-production process are described in a technical report just released.

Hafnium and zirconium have widely different characteristics in the field of atomic energy. Zirconium does not absorb neutrons and thus is used as a structural and cladding material in nuclear power units, the most prominent one being in the submarine Nautilus. Hafnium, on the other hand, absorbs neutrons so effectively that it can be used as a radiation shield.

To meet AEC requirements, the Bureau of Mines created a process for making hafnium-free zirconium. The high-grade hafnium product of the process is treated to yield pure hafnium, which is now produced in sufficient quantities for testing its usefulness on a large scale.

Hafnium and zirconium are so closely related that the identity of hafnium remained undetected until 1923, when the element was discovered by Danish researchers.

The Bureau also reports that the oxide and carbide of hafnium have extremely high melting points and thus might have some future role in jet engines.

A copy of Report of Investigations 5169, "Production of Hafnium," by H. P. Holmes, M. M. Barr, and H. L. Gilbert, can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

•

Apex Increasing Capacity

Apex Smelting Co., one of the nation's largest smelters and alloyers of aluminum, last week started construction on the second stage of its California smelting plant in Los Angeles. It will double the capacity of the plant.

Louis Lippa, president, announced that initial work was under way for an addition to the plant, with completion scheduled for early 1956.

The expansion was necessitated by the company's desire to keep pace with the rapid growth of the aluminum industry. It was pointed out that while the present addition will double the capacity, the building itself will permit a still larger capacity when needed.

•

Bauxite in Third Quarter

Mine production of bauxite decreased about 15% from the second to the third quarter of 1955, according to the Bureau of Mines. During the third quarter, 94% of the output was from mines in Arkansas. Bureau of Mines data on U. S. bauxite mining, by quarters, in thousands of long tons, follow:

		Mine output	(a) Imports for consumption	New supply for consumption
1954	Jan.-Mar.	402	1,350	1,752
	Apr.-June	371	1,319	1,690
	July-Sep.	689	1,304	1,993
	Oct.-Dec.	544	1,319	1,863
1955	Jan.-Mar.	494	1,213	1,707
	Apr.-June	482	1,217	1,699
	July-Sep.	410	1,383	1,793

(a) Includes imports of crude and dried bauxite only. Excludes calcined ore.

The Office of Defense Mobilization closed the bauxite expansion goal on September 29. This goal, along with a number of others, had been suspended on August 11 pending a review of the industry.

Gold
Lead
Bismuth
Arsenic

Silver
Zinc
Cadmium
Tellurium

Antimonial Lead

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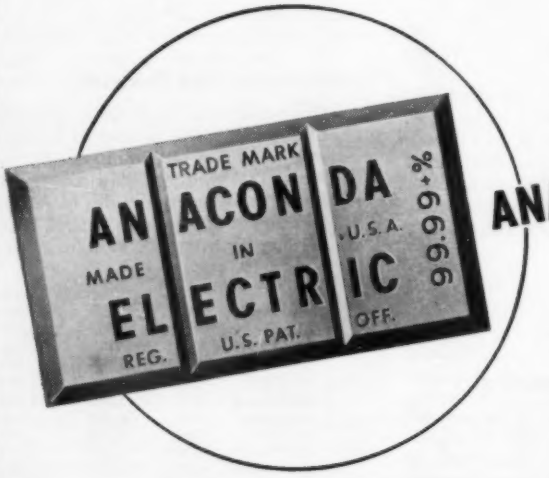

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